ever, owing to the weather, may take comfort in the reflection that they lost very little. Of course, further observations may come to hand from distant places where the stars shone and meteors fell. If so, we may possibly have to modify our present ideas; but from the materials now before us, we can only draw the following conclusions:—

(1) The state of the atmosphere generally was very unfavourable for the observation of meteors.

(2) The number of meteors which appeared was small, and never at any time formed a display of special richness.

(3) The earth was too far in advance of the cometary nucleus to encounter the denser region of the meteoric stream.

But the observations obtained this year, if of a negative character, and very discouraging from an observational point of view, will yet be important as affording evidence of the tenuity of that section forming the vanguard of the stream.

The meteoric observer, disappointed as he has been in 1897 and 1898, may yet look forward with every confidence to the brilliant displays which will mark the years 1899, 1900 and 1901. W. F. DENNING.

NOTES.

IT has already been announced that in connection with the Royal Society the Colonial Office has instituted a Commission to investigate the subject of tropical malaria. We are now informed that the medical officers selected for the work in Africa are Dr. D. Daniels, of the Colonial Office Medical Service, Dr. Stevens, and Dr. Christopher. Dr. Daniels has sailed for India in order to make himself acquainted with the recent observations of Surgeon-Major Ronald Ross, of the Indian Medical Service, connecting the spread of malarial disease with certain species of mosquitoes. The two other gentlemen referred to will go direct to Nyasaland, in British Central Africa, to study malarial disease in that locality; and will eventually be joined by Dr. Daniels. With the knowledge acquired in a comparatively temperate climate, where, however, fever has of late years been peculiarly fatal, the three medical officers will, at a later date, visit West Africa, possibly on the Niger. The Royal Society proposes to contribute towards the expense of the investigation, the British Government, through the Foreign and Colonial Offices, finding the remainder. It is estimated that the investigations will occupy about two years, and reports will be submitted from time to time to a Committee nominated jointly by the Royal Society and the Secretary of State.

IT will be remembered that the late Mr. Alfred Nobel left almost the whole of his fortune to be converted into an international fund for the advancement of scientific research (see NATURE, vol. lv. p. 232). The bequest gave rise to a dispute, which we are glad to learn has been settled by a compromise between the contesting parties. The relatives of the deceased will receive 3,800,000 Swedish kronor, or about 211,000*l.*, so that there still remains for the prizes the sum of 25,000,000 kronor, or nearly 1,400,000*l.* The income, computed at the rate of 3 per cent., will make the five prizes worth 150,000 kronor, or 8300*l.* each. It is expected that the compound interest during the time, which will necessarily be long, that will elapse before the prizes can be awarded, will increase the capital so as to cover the cost of managing the funds and the work entailed in properly distributing the prizes. It will be remembered that these prizes are to be awarded annually to persons making the most important discoveries in physics, chemistry, physiology or medicine. There is also to be a prize for the best literary contribution upon the subject of physiology or medicine, and also one for any person who has achieved the most or done the best things looking towards the promotion of the cause of peace throughout the world.

M. A. MICHEL LÉVY has been elected a corresponding member of the Berlin Academy of Sciences.

WE regret to see the announcement of the death of Dr. James I. Peck, assistant professor of biology in Williams College, and assistant director of the Marine Biological Laboratory at Woods Holl.

THE first competition offered by the Nansen Fund, which was established soon after the return of the *Fram* in 1896, has just been advertised. The subject is a thorough work in embryology based on original investigation, and the amount of the prize is 1500 kroner (about 80*l.*) The result will be announced at the annual meeting of the Christiania Academy of Science, May 3, 1900.

THE Christmas Course of Lectures, specially adapted to young people, at the Royal Institution, will be delivered this year by Sir Robert Stawell Ball, F.R.S. The subject will be "Astronomy," and the lectures (which will be illustrated by models and the optical lantern) will deal with the sun, the moon, the inner planets, the great planets, shooting-stars, and new methods. The first lecture will be delivered on Tuesday, December 27, at three o'clock, and the remaining lectures on December 29 and 31, and on January 3, 5 and 7, 1899.

THE death is announced at Paris, at the age of seventy-four, of M. J. N. Raffard, distinguished for his inventions and papers on science and technology. His inventions include governors for engines, several ingenious dynamometers, and many other appliances; he was the first to construct in Paris an electric tram-car worked by accumulators. He was a member of the Committee of Mechanical Arts of the Paris Société d'Encouragement, and also of the Editorial Committee of the *Revue de Mécanique.*

SIR GEORGE BADEN-POWELL, K.C.M.G., whose death, at the comparatively early age of fifty-one, we regretfully announce, took an active interest in scientific affairs, and in many ways assisted the advancement of natural knowledge. He was the son of the Rev. Prof. Baden-Powell, the Oxford geometrician and geologist. In 1896, he rendered a most valuable service to astronomy by conveying a small party of observers to Novaya Zemlya to make observations of the total eclipse of the sun. It will be remembered that on account of unfavourable weather the eclipse was not observed in Norway, where most of the British observers were situated; but, fortunately, better conditions prevailed at Novaya Zemlya, and excellent photographs were obtained of eclipse phenomena. The total failure of the British expeditions was thus saved by Sir George Baden-Powell's timely aid. His death will be mourned by many friends in the scientific world.

SIR JOHN FOWLER, K.C.M.G., Bart., the distinguished engineer, died on Sunday, at the age of eighty-one. His name is associated with some of the greatest engineering triumphs of this century. He was responsible for the design and construction of the Underground (Metropolitan) Railway, and carried out the scheme successfully in the face of gigantic difficulties and great opposition. He was engineer-in-chief of the Forth Bridge, which he designed in association with Sir Benjamin Baker, and he planned and commenced in 1875 the Sudan Railway to Khartum, now on the point of completion. It was in consideration of his work for the benefit of Egypt that in 1885 the Queen conferred upon him a Knight Commandership of St. Michael and St. George. For his services in connection with the Forth

Bridge, he was created a Baronet in 1890. He was president of the Institution of Civil Engineers in 1866, and delivered from the chair a very memorable address on the requirements of a complete engineering education. In 1890 he received the honorary degree of LL.D. from Edinburgh University.

PROF. CHARLES-MICHEL BRISSE, whose death occurred on October 13, was born in Paris on September 8, 1843, and lived a life of activity and usefulness. He was professor of mathematics at the lycée Condorcet for twenty-four years, and he also held the posts of tutor at the École Polytechnique, supplementary professor at the Conservatoire des Arts et Métiers, professor at the École Centrale, and professor at the École des Beaux-Arts. He was the author of papers on the displacement of figures and on the general theory of surfaces, and he translated into French several English and German works on the higher branches of mathematics. He also published numerous memoirs on actuarial subjects. In collaboration with M. Andre and M. Rivière, he published two editions of a "Course de Physique" for use in classes of mathematical physics. He was connected with the *Journal de Physique* for many years, and an appreciative note upon his services to the journal and to science appears in the November number.

THE temperature-entropy or "theta-phi" diagram of a substance, in thermodynamics, has been made well known to engineers through the writings of Mr. J. Macfarlane Gray. Those who wish to become familiar with an actual theta-phi diagram, or to study the properties of steam by its aid, will be glad to know that a diagram for one pound of steam at temperatures from 100° to 400°, designed by Captain Sankey, is now published by Messrs. Albert Frost and Sons, of Warwick House, Rugby. The basis of the chart is the water line and saturated steam line, and the space between these is closely divided by constant pressure and constant volume lines, which are extended into the superheated steam field; lines of constant dryness-fraction are also given. There are scales giving total heat, water-heat, and internal energy, from which these quantities can be read off without interpolation.

MR. PHILIP E. BERTRAND JOURDAIN sends us several notes reprinted from the *Journal* of the Royal Microscopical Society, 1898, pp. 395-400, dealing with improvements in microscopic lenses, with especial reference to photo-micrography. In the first of these notes he describes and figures an apochromatic objective and projection-ocular without fluorite, computed by Prof. Charles S. Hastings; but no information as to the precise nature of the glasses seems to be divulged by the makers. In a second note Mr. Jourdain describes a method of adjusting the sizes of the coloured images yielded by the Cooke lens; while a third note is devoted to a description of the planar lens recently computed by Dr. Rudolph, which, on account of its large aperture and wonderfully perfect astigmatic corrections, is admirably adapted for low-power micrography.

A SHORT article on the colours of lakes and seas, by Prof. Richard Abegg, of Göttingen, has been reprinted from the *Naturwissenschaftliche Rundschau*, xiii. 14. The author upholds the theory of Bunsen to account for the connection between the blueness of water and its purity: namely, that water itself absorbs red and yellow rays in preference to blue, and the purer the water the greater distance has the light to travel before being reflected by suspended particles, and therefore the greater the preponderance of blue. Bunsen's theory of selective absorption, combined with Soret's application of Tyndall's theory of the colours of the sky to water, are regarded by Prof. Abegg as affording a satisfactory qualitative solution of the question; but a number of interesting problems of a quantitative character still remain to be solved, and in this connection M. Spring's investigations are criticised at some length.

Some remarkable facts with regard to the electrical transmission of power in mining were brought forward by Mr. W. B. Esson in a paper read at the Institution of Civil Engineers on November 15. It was shown that the disadvantages attendant upon expensive transport of ore have been to a large extent neutralised by the electrical transmission of power. By using electrically-transmitted power the crushing-mills can be placed at the mine, and the serious expense of transporting the ore to the site of the water-power can thus be saved. Generally, electricity furnishes the only practicable means for transmitting power for mining operations, and the ease with which a copper wire can be carried over any kind of country, together with the plastic nature of the material, renders the electrical conductor the simplest and most trustworthy of all vehicles for power transmission. The plant erected at the Sheba Gold Mining Company's mine for the electrical transmission of power to the crushing-mills, five miles distant, was described by Mr. Esson, and the cost of milling was shown to be 1*s.* 8*d.* per ton of ore, as against 6*s.* 1*d.* per ton when aerial ropeway transport was used, and 1*l.* 12*s.* 6*d.* per ton during the time of ox-waggon transport. The water-power is obtained by a dam across the Queen's River, two miles above the generating station, to which the water is conveyed partly in open race and partly in tunnel. The maximum head derived is 32 feet. The turbines are of the Victor horizontal type, driving a countershaft of 300 revolutions per minute by ropes, and are together capable of developing 396 horse-power. The generating plant consists of three alternating-current dynamos supplying current at 3300 volts. The current is transmitted by cables to the mine, and at the receiving-house the pressure is reduced to 100 volts for driving motors and lighting the workings. The crushing-mill at Sheba works night and day; and in one year, of the possible 365 days of 24 hours each, the pressure cut off the conductors was only 4 days, 8 hours, 22 minutes, which were chiefly occupied in inspecting the water-race, overhauling the belts, ropes, &c., and in executing general repairs to the machinery. The efficiency of the plant from the turbine shafts at the generating station to the motor shafts at the mine may be taken as 70 per cent.

"IT is now some eighteen years since Mr. George Eastman, as an amateur photographer, began experimenting in a dark room in his own house with the intention of manufacturing photographic dry plates. . . . This was the modest beginning which blossomed in 1881 into the Eastman Dry Plate Company." So writes "Hermes" (*Commerce*, October 26, p. 785) in his interesting article under the heading "Every one his own photographer." Most of our readers have practised the art of photography at some time or other, and many have, without doubt, been users of the well-known Kodak and Eastman's films and papers. It is with these that the writer of the above-mentioned article deals; in fact, he gives an interesting digest of the history of this big firm since its commencement. So great and rapid has been the growth of this company, that in addition to their large manufactories in Rochester, New York, an equally large establishment has grown up in England, having its chief works at London and Harrow. The latter send their photographic materials over the whole world, with the exception of America, which is supplied from Rochester. Users of these materials will therefore read this article with interest, for not only will they be made acquainted with the numerous buildings and show-rooms by means of excellent reproductions, but the workshops and other manipulating sections are interestingly described by "Hermes," who has made a tour of all the company's premises.

THE *Engineering and Mining Journal* announces that Dr. Napier Ford has invented a substitute for rubber, namely perchoid, which is described as an oil that has undergone a high degree of oxidation. The oil is heated with litharge, stirred long and continuously, and then allowed to cool. Specially prepared tow is then dipped into it and placed in wire baskets, and exposed to air. The oil admitted to the filaments of the tow thus becomes wholly oxidised. This is drawn through rollers, and comes out a leathery material closely allied to, if not identical with, rubber. Its tenacity is increased by mixing sulphur with it. It is said that perchoid can be rolled as thin as a piece of tissue-paper, and that it makes leather impervious to moisture, though not to air.

SOME ten years ago a French missionary started the systematic rearing of two kinds of spiders for their web, and the *Board of Trade Journal* states that a spider web factory is now in successful operation at Chalais-Meudon, near Paris, where ropes are made of spider web intended for balloons for the French military aeronautic section. The spiders are arranged in groups of twelve above a reel, upon which the threads are wound. It is by no means easy work for the spiders, for they are not released until they have furnished from 30 to 40 yards of thread each. The web is washed, and thus freed of the outer reddish and sticky cover. Eight of the washed threads are then taken together, and of this, rather strong yarn cords are woven, which are stronger and much lighter than cords of silk of the same thickness. These spider web ropes are very much more expensive than silk ones, but it is hoped to reduce their cost somewhat in the future.

AT the meeting of the Academy of Science of St. Louis on November 7, Mr. James A. Seddon, of the Missouri River Commission, presented a paper on resistance to flow in hydraulics, in which the point was made that relatively a small part of this resistance, so far as open streams were concerned, was directly attributable to friction against the bottom and limiting banks, but that the resistance was found acting between accelerations and impacts, and showed in forced distortions of the free surface, from which forms the energy passed into internal motion.

WE learn from *Science* that the State Legislature of Vermont has passed an Act providing for the equipment and maintenance of a State laboratory, which shall include in its work "the chemical and bacteriological examination of water-supplies, milk and all food-products, and the examination of cases, and suspected cases, of diphtheria, typhoid fever, tuberculosis, malaria, and other infectious and contagious diseases." The sum of 1000*l.* has been granted for the establishment of the laboratory, and 1600*l.* per year voted for current expenses. Dr. J. H. Linsley is director of the laboratory. It appears that only three States have established similar laboratories—Michigan, Massachusetts and New York.

WE have received from Prof. B. Sresnevsky, director of the Iouriev (Dorpat) Observatory, the twelfth yearly report upon the rainfall of the Baltic provinces of Esthonia and Livonia. The observations refer to the year 1897, and contain monthly and yearly values, and the number of rainy days, for 125 stations, and the same values are also grouped into districts. Although not stated in the title, the work also contains temperature observations made at 8 a.m., and these are treated in the same way as the rainfall values. The ten-yearly mean of rainfall for the whole district is 21·9 inches, and the average number of rainy days is 162. The driest month is January, and the wettest, July. The general mean of the yearly temperature (for 8 a.m.) is 39°·4 (January 18°·5, July 62°·2). The results have been prepared by Dr. A. von Oettingen, formerly director of the Dorpat Observatory, and we are glad to see that, as soon as values for fifteen years have been obtained, it is proposed to issue a general summary, with diagrams.

THE Pilot Chart of the North Atlantic Ocean, published by the Hydrographer of the U.S. Navy for November, gives some interesting details of the track followed by the recent destructive hurricane in the West Indies. The centre of the storm passed to the southward of Barbados at 9h. 30m. p.m. on September 10; and reached Kingstown, St. Vincent, at noon on the 11th. From St. Vincent, the hurricane moved north-westward at the low rate of six miles per hour, and gales were experienced within a radius of 75 miles from its centre. On the 12th and 13th it was central to the west of the Lesser Antilles, turning to the northward on the latter date. On the 14th it continued its north-westerly course, recurving to the north-east on the 17th, near latitude 30° N. and longitude 71° W. The British steamship *Irrawaddy*, from port of Spain to New York, encountered the hurricane on the 11th, and kept within the storm area until the 18th; she had strong winds to gales of hurricane force throughout this period. On the 18th and 19th the storm pursued a north-easterly course, moving at the rate of twenty-five to thirty miles an hour, its area being increased considerably. The last report received by the U.S. Office was from the British steamship *Hesperia*. She reports, latitude 42° N., longitude 42° W., on September 20: "Winds S.S.W., force 10, shifting N.W., lowest barometer 29·62 inches; squalls blowing with terrific force; sea at times mountainous." The storm seems to have followed a somewhat more northerly and seaward course than the average track for September, as calculated by Padre Viñes in his investigation of the general movements of West Indian hurricanes, published by the Weather Bureau of Washington.

THE next volume of the *Transactions* of the Woolhope Field Club will contain a valuable paper (of which some copies have been printed) on the Hereford earthquake of December 17, 1896. The paper is the joint work of Mr. H. Cecil Moore, the Secretary of the Club, Mr. R. Clarke and Mr. A. Watkins, and gives the results of careful inquiries made in the central county of Herefordshire with regard to the damage caused by the earthquake. In the city of Hereford alone, it appears that 218 chimneys had to be rebuilt; but in the parish of Fownhope the damage was relatively greater, for twenty-two chimneys were repaired or rebuilt. The authors remark that a circle of six miles radius, with its centre at the centre of the ancient upheaval of the Woolhope Valley, includes by far the greatest damage in the county. The paper is illustrated by two plates, one showing the fractures in several pinnacles of Hereford Cathedral and other churches; the second being a map of the county, on which are marked the places where buildings were damaged.

THE Geological Survey of England and Wales has lately published short explanations of the new series maps relating to the country around Bognor and Bournemouth, by Mr. Clement Reid. We are now able to call attention to another explanation relating to Eastbourne, by the same author, and printed for H.M. Stationery Office, price 6*d.* It contains a general account of the geology of this favourite residential district, which includes not only Eastbourne, but also Newhaven and Seaford. The strata comprise the Cretaceous rocks from the Weald Clay to the Upper Chalk, the Lower Eocene strata, and superficial Drifts. Illustrations are given of the characteristic fossils. Mr. Reid calls attention to certain disturbances seen on the foreshore near Beachy Head, and a study of these leads him to conclude that the Chalk of the South Downs, unlike that of the North Downs, is not connected across the Channel with France

Brief notes on water supply and economics are also given in this little pamphlet.

Among noteworthy acquisitions by purchase referred to in the Report of the Trustees of the Australian Museum, which has just come to hand, is the Mount Stirling meteorite, a mass of meteoritic iron weighing more than 200 lbs., found in Western Australia; a valuable collection of opalised reptilian remains, including the remains of the Mesozoic reptile *Cimolisaurus leucoscopelus*; a specimen of the very rare Golden-winged Parakeet (*Psephotus chrysopterygius*) from Port Darwin, only three examples of which are believed to be known; and some eggs of the Jabiru (*Xenorhynchus asiaticus*). The total number of acquisitions was 11,099, of which 7379 were presentations, 1455 were exchanges, 277 were purchases, and 1888 were collected by members of the staff. Sir William MacGregor contributed nearly one thousand ethnological specimens from his New Guinea Collection. The curator, Mr. R. Etheridge, jun., points out that the museum staff needs a trained collector. At present the funds at the disposal of the Trustees will not permit of such an appointment being made, which is regretted because museums and institutions in other countries send collectors to Australia and take away the best specimens.

Forest resources are receiving increased attention in many places. A short time ago we recorded the establishment of the New York State College of Forestry for the professional education of the managers of the forests of the State. A report on the forestry conditions of Northern Wisconsin, containing the results of an investigation carried out by Mr. Fillibert Roth, has now been published by the Wisconsin Geological and Natural History Survey. As in many other cases, the forests of the State are shown to have been treated destructively. The wooded area is steadily being reduced, and at present nothing is done to protect or re-stock the "cut-over" lands, which are now unproductive waste land. Mr. Roth estimates that this policy causes a loss of 800 million cubic feet of wood per year to the State, besides driving from the State the industries which have been most conspicuous in its development, depriving a cold country of a valuable factor in its climatic conditions, and affecting detrimentally the character of the main drainage channels of the State. It is hoped that the report will aid in the formulation of rational forestry legislation, and so help to develop and restore the great forest resources of the State of Wisconsin.

Many items of interest are contained in Mr. Edgar Thurston's report on the Madras Government Museum for the year 1897–98. How much appreciated the museum is may be judged by the fact that as many as 47,260 visitors have been admitted on a single day. The proportion of those able to sign their names to that of those unable to do so was about 1 : 6 on week days and 1 : 3 on Sundays. This is satisfactory as showing that Sunday opening continues to appeal to the educated classes, who are prevented by business from visiting the museum on week-days. Dr. A. G. Bourne made three tours during the year, viz. to the South Arcot district, the Palni, and the Shevaroy Hills. They were all undertaken with the view of filling gaps in the herbarium, and continuing the botanical survey. Particulars with reference to these expeditions, and the numerous specimens collected, are given in appendices to Mr. Thurston's report.

Some remarks upon the practicability of destroying prickly-pear (*Opuntia Dillenii*) by means of the cochineal insect, are made by Dr. Bourne in an appendix to the report referred to in the foregoing note. Dr. Bourne points out that the historical evidence weighs entirely against the practicability of destroying prickly-pear by the cochineal insect. There seems to be no doubt but that the cochineal insects and the cacti are all introductions, and the net result has been that the yellow-flowered cactus has thoroughly naturalised itself, while the cochineal insect has just managed to struggle on here and there. There is evidence that cochineal insects were introduced five times between 1795 and 1883, with a view to the establishment of the cochineal industry in the country. In 1807 Government offered a reward of 2000*l.* for its successful introduction. It never became thoroughly established. It was, however, possible that, although a fine variety of the insect best for industrial purposes would not flourish, a wilder variety might become more or less naturalised. This has occurred to a small extent, and the idea of utilising this to destroy prickly-pear has been from time to time put forward. Dr. Bourne's investigations, however, show that it is impracticable to destroy prickly-pear by the so-called "wild" variety of the cochineal insect; and even if the scheme were practicable, he doubts the advisability of encouraging the development of an insect which might eventually become an infinitely greater pest than the prickly-pear.

A catalogue and price list of the papers of the late Prof. E. D. Cope, arranged chronologically, with a price list of plaster casts, has been issued by Mrs. Cope, Haverford, Pennsylvania, U.S.A., who offers the papers and casts for sale.

Twenty-five papers on diseases of children will be found in the ninth volume of *Transactions* of the American Pediatric Society, edited by Dr. Floyd M. Crandall, and just published. The address of the president, Dr. Samuel S. Adams, deals with the evolution of pediatric literature in the United States.

A new edition of Babington's "Manual of British Botany" is in preparation by Messrs. H. and J. Groves. The first edition of this work was published in 1843; the eighth in 1881. It is hoped that the forthcoming edition—the ninth—for which the late author had accumulated many notes, may be ready early in next year.

Dr. F. Krantz has issued a good catalogue (printed in German, French, and English) of minerals and geological specimens which he has in stock at the Rheinisches Mineralien-Contor, in Bonn. The catalogue contains particulars as to many collections of minerals arranged for purposes of instruction, and also for use with specified text-books of mineralogy. Lists of instruments and appliances used in the examination of minerals are also included.

The additions to the Zoological Society's Gardens during the past week include two Red-sided Eclectus (*Eclectus pectoralis*, ♂ ♂) from New Guinea, presented by the Chevalier Angelo Luzzati; two Undulated Grass Parrakeets (*Melopsittacus undulatus*, ♂ ♀) from Australia, presented by Mr. A. J. Finch; a Booted Eagle (*Niseatus pennatus*) from Southern Spain, presented by Captain T. E. Marshall, R.A.; two Tawny Owls (*Syrnium aluco*), British, presented by Mrs. Borrer; a Red-fronted Amazon (*Chrysotis vittata*) from Porto Rico, presented by Mr. G. A. Phillips; a Cereopsis Goose (*Cereopsis novaehollandiae*) from Australia, presented by Sir Cuthbert Peek, Bart.; two Gold Pheasants (*Thaumalea picta*, ♂ ♀) from China, presented by Mr. W. A. Upton; two Red-bellied Wallabys (*Macropus billardieri*, ♂ ♀) from Tasmania, presented by Major C. J. Urquhart; a Red and Yellow Macaw (*Ara chloroptera*), a Blue and Yellow Macaw (*Ara ararauna*) from South America, presented by Mr. W. Murray Guthrie; two Vulpine Squirrels (*Sciurus vulpinus*, ♂ ♀) from North America, a Slaty-headed Parrakeet (*Palaeornis schisticeps*) from Northern India, deposited; a Hyacinthine Macaw (*Anadorhynchus hyacinthinus*) from Northern Brazil, a Hobby (*Falco subbuteo*) from Holland, purchased.